

IN THE CLAIMS:

*Please replace claims 19, 21, 22, 24, and 27 as follows:*

19. (Amended) A reactor according to claim 18, wherein the fluid flow passages comprise serpentine portions including a series of short, sharp turns.
21. (New) A process for performing chemical reactions under controlled temperature conditions, the process comprising:
- (a) delivering reactant fluids successively through a chemical reaction zone to achieve a reaction and through a heat exchanger that bounds the chemical reaction zone and that allows heat exchange between the reactant fluids and a heat transfer medium, the heat exchanger at least in part being defined by a printed circuit heat exchanger (PCHE) panel providing (1) passages providing for flow of the heat transfer medium therein and (2) passages providing for flow of the reactant fluids therein;
  - (b) introducing the heat transfer medium to the PCHE panel; and
  - (c) causing the heat transfer medium to pass in at least two differing directions through the passages in the PCHE panel with respect to the flow of fluid reactants through the passages in the PCHE panel.
22. (Amended) A reactor comprising:
- (a) first and second adiabatic beds of catalyst, each of which includes a catalyst,
  - (b) a heat exchange panel disposed between said first and second beds, the heat exchange panel including;

(1) printed circuit heat exchange (PCHE) plates for receiving heat exchange medium, at least one of the PCHE plates including (i) a heat exchange medium inlet and a heat exchange medium outlet, the inlet and outlet being disposed on opposite ends of the PCHE plate, and (ii) a passage between the heat exchange medium inlet and the heat exchange medium outlet, the passage being configured to permit a heat exchange medium flowing therethrough to flow multiple times across the PCHE plate;

(2) a reactant fluid flow plate having a passage through which reactant fluids can flow, the reactant fluid flow plate being disposed between two PCHE plates, and

(3) a header located external to and at each end of the PCHE plates, each header including a partition to separate the inlet and the outlet at each end.

24. (Amended) A reactor according to claim 22, wherein the heat exchange medium comprises at least one of a molten salt, a molten metal, a hot liquid, a hot gas, a steam, a superheated steam, a chilled liquid, a chilled gas, a vaporizing fluid, and a condensing fluid.

27. (Amended) A reactor comprising:

(a) reaction zones;

(b) a heat exchanger panel disposed between said reaction zones, and

including at least first and second superposed printed circuit heat exchange (PCHE) plates, wherein surface structures on the PCHE plates form

(i) a heat exchange medium inlet and a heat exchange medium outlet, one of the heat exchange medium inlet and the heat exchange medium outlet being disposed on an upper side of the panel and the other being disposed on a lower side of the panel, and

(ii) a passage between the heat exchange medium inlet and the heat exchange medium outlet, the passage permitting a heat exchange medium to flow horizontally across the panel,

(c) a reactant fluid flow plate through which reactant fluids can flow, the reactant fluid flow plate being disposed between two PCHE plates, the reactant fluid flow plate including:

(i) a reactant inlet and a reactant outlet, the reactant inlet and the reactant outlet being disposed on opposite sides of the reactant fluid flow plate, and

(ii) a passage between the reactant inlet and the reactant outlet, the passage permitting reactant fluids to flow across the reactant fluid flow plate in at least one pass; and

(d) a header located external to and at each end of the reactant fluid flow plate and the PCHE plates, each header including a partition to separate the inlet and the outlet at each end of the respective plate.

*Please add new claims 28 and 29 as follows:*

28. (New) A reactor to claim 12, wherein at least two differing plate designs are used to make up the panel.

29. (New) A reactor according to claim 20, wherein the catalyst bed includes a catalyst comprising one of spherical bodies, cylindrical bodies, hollow bodies, solid particles, expanded particles, porous solids, wire mesh coated matrix catalyst, and woven gauze coated matrix catalyst.